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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,866	08/18/2003	David A. Smith	E-2291-1	3351
7590	06/21/2005		EXAMINER	
Frank J. Bonini, Jr., Esquire Harding, Earley, Follmer & Frailey 86 The Commons at Valley Forge East 1288 Valley Forge Road, P.O. Box 750 Valley Forge, PA 19482-0750			KOEHLER, ROBERT R	
			ART UNIT	PAPER NUMBER
			1775	
DATE MAILED: 06/21/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/642,866	SMITH ET AL.
	Examiner Robert R. Koehler	Art Unit 1775

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on April 11, 2005 (Amdt., Decl., Oath).
- 2a) This action is FINAL.                            2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) 1-18 and 32-36 is/are allowed.
- 6) Claim(s) 19-31 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

RPK  
6-13-05

#### Attachment(s)

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)              |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____. | 6) <input checked="" type="checkbox"/> Other: <u>Marked-Up Copy of Page 1</u> .          |

**DETAILED ACTION**

***Examiner's Amendment***

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

By way of this Examiner's Amendment, the following change is made in the specification. At line 8 on page 1 of the specification, immediately after the year "2003," insert the wording --, now abandoned--.

This minor change in the specification is made in order to update the status of copending application Serial No. 10/382,040.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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Evaluations of the level of ordinary skill in the art requires consideration of such factors as various prior art approaches, types of problems encountered in the art, rapidity with which innovations are made, sophistication of technology involved, educational background of those actively working in the field, commercial success, and failure of others.

The "person having ordinary skill" in this art has the capability of understanding the scientific and engineering principles applicable to the claimed invention. The evidence of record including the references and/or admissions are considered to reasonably reflect this level of skill.

Claims 19 to 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,444,326 B1 (Smith).

Smith teaches a method of modifying the surface properties of a substrate by depositing a coating of hydrogenated amorphous silicon on the surface of the substrate and functionalizing the coated substrate by exposing the substrate to a binding reagent. The hydrogenated amorphous silicon coating is deposited by exposing the substrate to silicon hydride gas under pressure and elevated temperature for an effective length of time. The silicon-coated articles taught by Smith are manufactured by initially cleaning the surface of the article within a steel vessel that is capable of containing a suitable environment for the cleaning operation, flushing the steel vessel with an inert gas and applying a vacuum, exposing the substrate to silicon hydride gas under elevated pressure and temperature for a predetermined period of time, optimization of the silane deposition process for the purpose of minimizing silicon dust and forming a uniform film, and purging the system with an inert gas to remove silane moieties not bound to the substrate surface. Smith also teaches the usage of a binding agent which reacts with and binds to the hydrogenated amorphous silicon surface via silicon hydride moieties. See line 28 in column 3 to line 18 in column 5. The Examiner also notes that lines 4 to 8 in column 4 teach the general mechanism by which a hydrogenated amorphous silicon layer is formed on a

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clean substrate surface. Smith differs from the claims in that Smith does not mention the production of a "silicon" coating (or layer) on a substrate.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have followed the same process steps and process conditions as taught by Smith for the purpose of forming a "silicon" coating or layer on a substrate surface. The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have replaced the "hydrogenated amorphous silicon layer" taught by Smith with the "silicon layer" because the substitution of art recognized equivalents as shown by Smith at lines 4 to 8 in column 4 (i.e., "hydrogenated amorphous silicon" being equivalent to at least the Si—Si moiety on the surface of the substrate and in the bulk) would have been within the level of ordinary skill in the art. A person skilled in the art of silicon-base coatings would have been motivated to rely on the Smith patent because the process steps and process conditions taught by Smith will produce a "silicon layer" on a substrate surface.

#### ***Allowable Subject Matter***

Claims 1 to 18 and 32 to 36 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: The prior art does not teach, suggest, or disclose a method of passivating a surface of a substrate by depositing a silicon layer onto the substrate surface wherein the silicon deposition must proceed by cycling the substrate through the claimed process steps for at least one cycle.

#### ***Response to Arguments***

The Examiner withdraws all of the double patenting rejections because applicants have stated in the Remarks filed on April 11, 2005 that copending Serial No. 10/382,040 has been abandoned. The Examiner also notes that applicants have not replied to the Office action of October 1, 2004 in Serial No. 10/382,040. The Examiner withdraws the rejection of all claims under 35 U.S.C. § 102(e) because the applicants have submitted a Declaration of the inventor,

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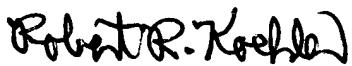
Mr. Gary Barone, which states that the invention disclosed in U.S. Patent No. 6,511,760 B1 was derived from him and is thus not the invention by another.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Robert Koehler whose telephone number is **(571) 272-1536**. The Examiner can normally be reached on Tuesday to Friday from 9:30 AM to 7:00 PM. The Examiner can also be reached on alternate Mondays.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Deborah Jones, can be reached on **(571) 272-1535**. The fax phone number for the organization where this application or proceeding is assigned is **703-872-9306**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866-217-9197** (toll-free).



**ROBERT R. KOEHLER  
PRIMARY EXAMINER**

**Art Unit 1775  
June 13, 2005**

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E-2291-1

## METHOD FOR CHEMICAL VAPOR DEPOSITION OF SILICON ON TO SUBSTRATES FOR USE IN CORROSIVE AND VACUUM ENVIRONMENTS

### 5 CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of, and  
claims priority from, U.S. Application Serial No.  
10/382,040, filed on March 5, 2003.  
*✓ now abandoned*

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### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates to a method for vapor deposition of silicon on substrates to impart properties for use in corrosive and vacuum environments. More particularly, the present invention relates to an improved method of applying a silicon passivation layer to the surfaces of substrates.

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#### 2. Brief Description of the Related Art

The present invention overcomes many known deficiencies by using silicon as a passivation layer for a variety of substrates, including those comprised of metal (ferrous and non-ferrous), glass, carbon, copper, quartz, nickel-containing ferrous alloys, titanium, aluminum and ceramics. Substrates comprised of these materials generally have been known to have undesirable properties, which may, for example include one or more of the following: chemisorption of other molecules; reversible and irreversible physisorption of other molecules; catalytic activity with other molecules;

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